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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]The antibacterial effect of this invention is large and it relates to the antibacterial compound extension polyester film which continues at a long period of time and can hold an antibacterial function.

[0002]

[Description of the Prior Art]Conventionally, polyester film is excellent in tough nature, heat resistance, dimensional stability, electric insulation, and chemical resistance, and is broadly used as a substrate of an industrial variety use. For example, it is used as information substrates, such as printing substrates, such as a foodstuffs wrapping material, a label, a sticker, and a face plate, tracing paper, a printer ribbon, and magnetic DEPU, and covering material by combination with other substrates.

[0003]Although it is possible to apply the paint containing an antimicrobial agent to the extension polyester film surface used for these, there is no film with the antibacterial properties as extension polyester film. Although known for JP,6-87711,A, JP,5-25012,A, etc. as an antibacterial constituent which consists of an inorganic compound containing silver, these antimicrobial agents are mixed in polymer, such as polyethylene and polypropylene, and ***** and the thing extruded and sheet-sized are known.

[0004]It is weak to the wear to ** etc., an antibacterial treatment coat exfoliates easily, and what applied to these extension polyester film surface the paint containing an antimicrobial agent does not bear practical use. an antimicrobial agent is mixed in polymer and it is ***** -- there is a fault of concentration volume of an antimicrobial agent not being made on the surface as for a thing, and being unable to perform exertion of an antibacterial function.

[0005]

[Problem(s) to be Solved by the Invention]The purpose of this invention makes the inorganic

compound which contains silver in a thin film surface layer concentrate and deposit, is equal also to surface wear, and there is in providing the antibacterial compound extension ester film which continues at a long period of time and can hold exertion of activation from that of an antibacterial function.

[0006]

[Means for Solving the Problem] This invention makes a gist antibacterial compound extension polyester film which film layer A containing an inorganic compound containing silver and film layer B laminate with A/B and A/B/A.

[0007]

[Embodiment of the Invention] A/B of this invention, and the compound extension polyester film of A/B/A, Polyester polymer is sheet[extrusion and]-ized with the composition of A/B or A/B/A by a compound cap (cast), this composite sheet is extended in the length direction two to 6 times, extension and heat setting carry out in the width direction further two to 6 times, and it is considered as a biaxially oriented film. moreover -- extruding and sheet-izing the single film B (cast) -- that B that carried out length extension after extending in the length direction -- A -- extrusion -- it laminates, and as A/B, it extends, heat setting is carried out in the width direction, and it is considered as an oriented film (in this case, B becomes biaxial stretching and A becomes uniaxial stretching).

[0008] Although the thickness of A and B which were extended is in the range whose direction of A is a thin film compared with B and whose thickness of A is 0.5-10 micrometers and it changes with the particle diameter of this inorganic compound to be used, In the thing of a several micrometers particle (1-5 micrometers), A of 5-10 micrometers is preferred, and A of 0.5-5 micrometers is preferred in the thing of an ultrafine particle (for example, 0.2 - 0.5 μm) of several micro or less.

[0009] the inorganic compound particle in A deposits this reason on A surface in the form fixed to polymer, and exertion does not have it in the activity of an antibacterial effect while an extension void is formed in the interface of polymer and an inorganic particle by extension -- it is for *****. 0.01-0.5 are applied to the thickness ratio of A/B constituted by extension. As for the addition in A polymer of this inorganic compound, 2 to 10 % of the weight is preferred, the antibacterial effect of the inorganic compound by extension cannot be expected at less than 2 % of the weight, and at more than 10 % of the weight, the surface layer of the extension void film of A becomes weak, and breaks (being wear etc.).

[0010] As an inorganic compound containing silver, it is the thing which made the inorganic compound support a silver ion, Zeolite, phosphoric acid zirconium, montmorillonite, hydroxyapatite, double phosphate, tripolyphosphate, magnesium aluminosilicate, a calcium silicate, titanium oxide, silica gel, dissoluble glass, etc. are applicable. As polyester film used by this invention, films, such as polyethylene terephthalate, polypropylene terephthalate, polyp

CHIREN terephthalate, and polyethylenenaphthalate, are applicable, for example. The surface A can apply the paint which consists of an inorganic compound which contains polymer and silver in these polyester film B extended in the length direction, can extend and carry out heat setting in the width direction as A/B, and it can be considered as an oriented film.

[0011]In this case, as an inorganic compound containing the silver which extended A is set more to 0.1-3 micrometers with a thin film, and is mixed by A, an ultrafine particle of 3 micrometers or less is preferred (preferably 0.1-0.5 μm). If a grain shape is larger than the thin film of A, in order to demonstrate an antibacterial function, it is effective, but exfoliation of an inorganic compound poses a problem by surface wear etc. The oriented film of B is applicable to 5-micro [250] thickness. Good polymer of adhesion with polyester film is chosen, and the polymer for spreading accepted by the A horizon can use polyester system acrylic, urethane system polymer, etc. As for the addition of the inorganic compound containing the silver to the inside of this polymer, 2 to 10 % of the weight is preferred, and as mentioned above, it can apply an ultrafine particle of 3 micrometers or less (preferably 0.1-0.5 μm). Also in the film layer of B, a small quantity etc. may contain the silver of quantity suitably.

[0012]As mentioned above, this inventions are film layer A containing the inorganic compound containing the silver of particles or an ultrafine particle, and compound extension polyester film which the film B laminates with A/B and A/B/A, The oriented film and A in which A and B carry out melting extrusion molding as an oriented film which it comes to apply to a B horizon, It is antibacterial compound extension polyester film which makes the surface concentrate and deposit the inorganic compound which contains silver as the thin film A by extension, is equal also to surface wear, and can be continued and held at exertion and long period of time of an antibacterial function.

[0013]This antibacterial compound extension polyester film Food packing material, the covering material to printed matter, The functionality of polyester film is combined for the surface in combination with inner package covering material, a label, a sticker, face plates (touch panel etc.), and a various substrate, and it is strong to dirt, clean, and the best for the use which can ask for clean nature.

[0014]

[Example]

Antibacterial-effect valuation method: In addition, the bacillus (Escherichia coli, Staphylococcus) which carried out plate culture for 24 hours by the nutrient agar medium which prepared the nutrient broth culture medium for the liquid diluted with sterile purified water 1000 times separately was distributed so that number of microorganism might serve as 5.0×10^5 - 10^2 /ml. 0.1 ml of this fungus liquid was dropped at two on a test piece (27x55 mm), the strengthening polyethylene film (plastic bag for stomachers) cut to 25x50 mm on it

was put, and it cultivated at 35 °C. After adding 10 ml of phosphate buffered saline and probing it 6 hours and 24 hours afterward, 1 ml was taken out, the bacterial number of survivals was measured with the pour-plate culture method using the SCDLP agar medium, and it converted into the bacterial number of survivals per specimen, and asked for the sterilization rate.

The raw material A which mixed 5 or less % of the weight of the inorganic compound (the product made from new east V SERAKKUSU, the cera powder type P01) containing silver with example 1 mean particle diameter of 2-3 micrometers to polyethylene terephthalate resin.

Apply a three-layer cap, and the molding cast of the polyethylene-terephthalate-resin B is co-extruded and carried out with the composition of A/B/A, 3 times were taken in the length direction by extension, heat setting was carried out in the width direction at extension and 220 °C 3 times, and the composite polyester film was obtained (A was 2 micrometers and B of thickness composition was about 30-micrometer film in 25 micrometers).

Extrusion molding of the example 2 polyethylene terephthalate resin is carried out, and it is more than 2.5 times 4.5 to the length direction. It extends less than double, this length oriented film top -- a poly acrylic resin (the product made from Japanese carbide.) the inorganic compound (the product made from new east V SERAKKUSU.) which contains the silver of 0.2 μm of mean particle diameter in NIKAZORU applying the liquid which mixed the cera coat type C01 5% of the weight by 18/m² of coverage -- further -- the width direction -- 2.5 -- more than double -- 4.5 -- the following extended, 200 °C heat setting was carried out, and a 25-micro film was obtained as compound extension polyester film.

[0015]Evaluation of the antibacterial effect was performed after the surface abrasion proof test (ten hand MOMI, Scotch tape peel test) of the compound extension polyester film obtained in Examples 1 and 2. The antibacterial effect of the biaxially oriented polyester film (Toray Industries, Inc. make and "lumiler" S10, 25micro) common as comparison was evaluated. The result is shown in Table 1.

[0016]

[Table 1]

表 1

大腸菌		
	8時間後の生残菌数	24時間後の生残菌数
対照	8,050,000 (減菌率)	580,000,000 (減菌率)
実施例 1	<100(99.9%)	<100(99.9%)
実施例 2	<100(99.9%)	<100(99.9%)
比較	1,030,000 (1.9%)	780,000 (25.7%)
当初添加菌数	1,050,000	1,050,000
黄色ブドウ球菌		
	8時間後の生残菌数	24時間後の生残菌数
対照	420,000 (減菌率)	1,200,000 (減菌率)
実施例 1	800 (99.8%)	<100(99.9%)
実施例 2	750 (99.8%)	<100(99.9%)
比較	330,000 (18.6%)	263,000 (35.1%)
当初添加菌数	405,000	405,000

It turns out that the compound extension polyester film (Example 1, Example 2) of this invention is excellent in antibacterial properties so that clearly from Table 1.

[0017]

[Effect of the Invention]As explained above, according to this invention, film layer A containing the inorganic compound containing silver and film layer B laminate with A/B and A/B/A, and sake, an antibacterial effect is high and it becomes possible to continue at a long period of time and to hold the antibacterial function moreover.

[Translation done.]